Appendix D. Initial environmental evaluation

Physical and biological environment summary

Bristol Bay Borough

for

Naknek Crossing Intermodal Economic Impact and Airport Use Study

An approved component of the Alaska Statewide Transportation Plan
4/25/2005

Naknek Crossing Intermodal Economic Impact and Airport Use Study
Physical and Biological Environment Summary
Bristol Bay Borough

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Summary

Crossing the Naknek River with a bridge and changing the status of airports in the Bristol Bay region will require an examination of the physical, biological, and human environment. Future actions, whether they are airport closures or change in operators, or bridge and road construction, will require action from the Federal Aviation Administration (FAA) for airports and the Federal Highway Administration (FHWA) at a minimum. As federal agencies, the FAA and FHWA are required to comply with the National Environmental Policy Act (NEPA) for all their proposed actions. The NEPA requires federal agencies to consider reasonable alternatives to their proposed action (including "no action") and evaluate the impacts to the human environment for each alternative. The human environment includes the physical (i.e., geology, soils, hydrology); biological (i.e., vegetation, wetlands, wildlife, fish); and human environment (i.e., socioeconomics, land use, noise, visual, subsistence).

An Environmental Assessment (EA) would need to be conducted for actions by the FAA or FHWA (or any other federal agencies that may be involved in the planning, funding, or construction of improvements). If impacts to the human environment are not considered to be significant, the project could move into final design and construction. If significant impacts are identified, an Environmental Impact Statement (EIS) would need to be conducted. The EIS process is more detailed than the EA process and requires additional time.

This Appendix presents a summary of the physical, biological, and human environment within the Bristol Bay Borough. More in-depth and site-specific studies would need to be conducted throughout a bridge and access road planning and design process.

Geology and soils

The Alaska Peninsula was produced by an island arc process. Frequent volcanic and seismic activity is caused by the subducting Pacific Plate and transform faults (i.e., Bruin Bay and Castle Mountain/Lake Clark). The surficial geology of the area is mainly composed of Quaternary age unconsolidated geomorphic deposits. The three main deposits are Quaternary alluvial, glacial moraine, and marine terrace deposits (Wilson et al., 1999). The area has undergone multiple glaciations, which dominate the landscape with till, moraine, glaciofluvial, and glaciolacustrine features.

Marine terraces and glacial outwash plains give the region gentle slopes with some hills of unconsolidated moraines. Alluvial and tidal processes have created cliffs and steep slopes near the banks of the main water channels. River outcrops and surficial geology are absent of bedrock in the project area (Muller, 1952). Soils are composed of glacial gravels, sand, silty sand, loess, volcanic ash, and clays. Some areas have shallow permafrost with areas of intense frost action.

The Soil Conservation Service performed a detailed soil study for the region. Soils were mapped as units depending on soil series, topographic slopes, and land types (Furbush et al., 1970). The study outlined five series of soils and two land types. The soils vary in drainage properties, texture, acidity, structure, and consistency. Some areas are well

drained and are composed of volcanic ash, sand, and gravel. Others are poorly drained with an abundance of clay and thick peaty mats. Because mapped soil units can vary and occur as small patches within other units, detailed mapping must be conducted at site-specific locations.

Geology and soils would need to be studied for bridge and road construction, both from engineering and environmental aspects. Additional material sites would need to be found for transportation improvements at South Naknek. The soils in the area generally consist of gravelly glacial material covered with volcanic ash and often are topped by an excessively thick organic layer. Site-specific information would need to be gathered for each alternative considered.

Surface hydrology and floodplains

The Naknek River drainage area is approximately 3,700 square miles. The watershed includes seven interconnecting lakes. Naknek Lake collects runoff from the volcanoes and mountains to the east, west, and south. The 22-mile Naknek River drains Naknek Lake into Kvichak Bay. The Naknek River is tidally influenced from the mouth to King Salmon. The diurnal range (average difference between mean higher high water and mean lower low water) is 22.6 feet at the mouth and 3.2 feet near King Salmon (NCDC, 1988).

Many small streams and creeks feed into the Naknek River. The U.S. Geological Survey gauged Eskimo Creek (located near the King Salmon airport) from 1973-1984. During those years, daily stream flow averaged 0.5 to 150 cubic feet per second, with highs occurring during spring and fall, and lows occurring during mid-winter. Eskimo Creek and King Salmon Creek (located west of King Salmon) are listed as Tier II on the state impaired waterbody list. Tier II water bodies have had assessments completed and now require Total Maximum Daily Load limits (described according to Section 303(d) of the federal Clean Water Act) or waterbody recovery plans for development projects that may impact the water bodies.

The Naknek River was down-listed from Tier I to Tier III in 1998. Tier III is not 303(d) impaired, but has an implemented waterbody recovery plan. Water quality is tracked and monitored by the Alaska Department of Environmental Conservation (ADEC). Pollutants include petroleum hydrocarbons, toxics, and other substances entering the river from the King Salmon Air Base landfill and fuel storage sites. The U.S. Air Force, the ADEC, and the U.S. Environmental Protection Agency (EPA) continue remedial activities at the Air Base.

Road construction may disrupt surface water hydrology. Further study will be required to determine whether dewatering, or inundation of habitat, are potential impacts of the project. Another area of concern is whether changes in surface water hydrology will compromise soil stability of the road, and/or its underlying substrate or degradation of permafrost elsewhere in the project area.

The effects that a bridge would have on the Naknek River would need to be evaluated. Ice, tidal influences, navigation channels, and/or fish and wildlife migration may affect or be affected by a bridge. Water quality of surface waterbodies, including the Naknek River, will need to be evaluated. Runoff from the bridge deck will need to be evaluated to

prevent storm water runoff from the bridge deck reaching the water. Potential sources of pollution, such as oil from vehicles, construction-related fuel storage and equipment fueling, de-icing compounds, and dust palliatives and their probable impacts need to be identified.

The U.S. Army Corps of Engineers defines flood plains as "lowlands adjoining the channel of a river, stream, or watercourse, or ocean, lake, or other body of standing water, which have been or may be inundated by flood water. The channel of a stream or watercourse is part of the flood plain." The Naknek River bed and the beds of its tributaries would be considered flood plains. Flood plains have not been mapped in the Bristol Bay region. Flooding has not been reported in King Salmon or South Naknek. Naknek is located on a bluff approximately 30 feet above mean sea level, so the flood hazard is low. However, structures located on lower banks may experience high water events. The highest known flood at Naknek occurred in 1917 and another coastal flood occurred in 1991 (USACE, 2004). Potential impacts to the Naknek River floodplain would need to be evaluated.

Geological and physical hazards

Geological and physical hazards in the Naknek River area include erosion, windstorms, flooding, earthquakes, volcanoes, permafrost, ice movement, and fog. The Naknek River flows through a high terrace and the steep banks consisting of unconsolidated silty sand are prone to erosion. Windstorms are rare, but damaging.

The Alaska Peninsula is located on the Pacific "Ring of Fire," a zone of frequent earthquakes and volcanic eruptions. Two major faults (Bruin Bay and Castle Mountain/Lake Clark) are located within 100 miles of the Bristol Bay Borough. However, earthquakes that do occur are at great depths and of low strength (BBB, 1993). Active volcanoes are located nearby, most notably Katmai and the "Valley of 10,000 Smokes."

The Naknek River area is located in a discontinuous permafrost zone. All structures and roads must be designed and built in a way that prevents or avoids subsidence from melting permafrost.

Ice in the Naknek River becomes safe for crossing around the end of November, with a thickness of more than 50 inches. Ice movement in the Naknek River is primarily due to tidal currents with wind speeding or slowing the movement (DMJM, 1983). Ice can move either upstream or downstream, depending on the wind and tide.

Mountains to the east, west, and south produce air currents that create a cloud cover in the Bristol Bay area. Air movements with high levels of moisture create low-level clouds that can cover the area with thick fog.

Climate

Temperature, precipitation, and wind data are collected at a weather station located at the King Salmon airport. Data are available dating back to 1941. The Bristol Bay Borough lies within a maritime climate influenced by the proximity of the Naknek River to the ocean. Seasonal temperatures are limited to a narrow range and vary from 42-63 degrees